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INDUSTRIAL EDUCATION IN CINCINNATI[1]

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For more than fifty years industrial education in Cincinnati was provided for almost exclusively by the Ohio Mechanics' Institute, a liberally endowed and well-equipped institution founded in 1828.

In 1906 Dean Schneider introduced into the department of engineering of the University of Cincinnati, a city institution supported by taxation, his well-known plan of co-operative education, the students spending alternate weeks in school and shop for five years, working summer and winter. A new building is nearly completed for the use of this department and the permanency of the method seems to be established.

In 1907 the Board of Education determined to offer an opportunity for vocational training, and began the erection of two new high schools, each costing, including equipment, nearly one million dollars. While they are cosmopolitan high schools in which all courses are offered, they provide especially for the industrial education of both sexes. These courses are designed to discover special aptitude and give general manual dexterity in the first two years. Then students are placed in commercial shops and continue their schooling either on the alternate-week plan for the next two years, or one-half day a week if the necessity of the individual case requires it. The boys give three to four hours of the six-hour day to wood work in the first

[1] Read at the meeting of the National Society for the Promotion of Industrial Education, Boston, November 18, 1910.

school year, and to metal work in the second year. In June of the second year, after their preference for a special trade has been discussed with their teacher, they are placed with employers. If they do not make good by September they may return to school and change their course. These schools are not trade schools, but they enable boys (or girls) to discover their aptitudes and enter a trade intelligently at sixteen, which is practically the legal age in Ohio. The school then follows them for two years and gives them practical knowledge, while skill in the trade is given in the real shop.

Of course the school shops run at night and are open to adult workers and also to apprentices. There are 2,400 enrolled at present in the industrial night classes. It was soon found, however, that night work does not attract the apprentice. Concentrated attention to a machine for ten hours leaves little surplus energy to draw on at night. A city offers many attractions more alluring to a young mechanic than a night school. After repeated and urgent advertising in shops, we were able to get less than eight hundred apprentices in the iron industry who would settle down to regular night instruction. For example, we got twenty-six pattern-maker's apprentices, and those dwindled to sixteen. They were not to blame. They had not the physical endurance.

Thus we came to see that the apprentice is distinctly a day-time proposition. His education must be given not in addition to his work, but in the place of a part of his work. Some of the progressive manufacturers of our city, realizing this, introduced apprentices' schools in their factories, but they found themselves unable single-handed to cope successfully with the situation for many reasons. An agreement was finally made with the Board of Education to establish a day school for machine-shop apprentices. The plan was submitted to the Central Labor Council, to a committee of manufacturers, and to the Board of Education, and received the approval of all.

The continuation school for machine-shop apprentices was opened September 1, 1909. It runs forty-eight weeks a year, eight hours a day, four and a half days a week, besides two half-

days which are spent by the teachers in visiting the boys in the shops, seeing the conditions under which they work, consulting with the foreman about the needs of the boys, and getting ideas and materials for their guidance in teaching. This is an essential part of their work, for there is no handed-down course of study as yet. It must be worked out as they go along.

The students keep a complete file of their work, so that the details of the course lie behind them instead of ahead of them. The course runs through four years, and consists of one hour of blue-print reading, freehand and mechanical drawing, one hour of practical mathematics, one hour of shop science and theory, and one hour for reading, English, spelling, commercial geography, and civics; the last hour takes the form of stereopticon talks, readings from industrial history, biography, and geography, and discussion of civic and labor questions.

There are about 200 students, divided into nine groups, according to proficiency. They come one half-day, four hours a week, and are paid their usual wage for attendance by their employer, and are docked for absence. The least mature boys come on Monday, the most mature on Friday, and graded groups between.

The grading of the students must be somewhat elastic, owing to the difficulty of arranging a program for the individual boy that will best suit the convenience of the manufacturer, and also owing to the great differences in the mental attainments of the boys—some having been in high school and some not able to repeat the multiplication table or spell the names of the days of the week. This necessitates having two teachers to a group of twenty or twenty-five, one to conduct the general work and the other to give much individual instruction.

The entire cost of the school is about three thousand dollars a year, or about fifteen dollars a pupil, on the basis of the average number in attendance.

Strange as it may seem, the chief difficulty encountered in the operation of public schools for apprentices is not in securing the interest of the employers, the approval of labor organizations, the willingness of boys to come, or the necessary funds

from the Board of Education; the chief difficulty is in securing properly qualified teachers, teachers who will command the confidence of foremen and employers by their knowledge of shop conditions, who will secure the interest of boys by their enthusiasm and skill in instruction, and who at the same time meet the demands of school authorities as to scholarship and character. We must steer clear of the charlatan on the one hand and on the other hand of the school pedant who has knowledge in water-tight compartments. After corresponding with technical schools all over the country and finding no suitable person, I decided to study the shop men of our own city and found a man who had worked nine years in the shops and had left to prepare to be a teacher. His old love for the shop came back to him, and he had been for several years teaching apprentices in the shop. He had worked over his whole scholastic outfit in terms of shop practice. He had studied the machines to see the problems they presented in mathematics, science, and drawing. Elimination of waste and economy of output was the guiding principle of his investigation and instruction. He trains his own teachers, and now has three under way, who are assisting by night or day.

The school operates at night for the improvement of adult machinists. On Friday night the class is composed of foremen —thirty-two at present—and their discussions illuminate all phases of shop work.

The work of the school is closely applied to the work of the shop. It is designed for the intellectual improvement of the boys and to give them intelligent interest in what they do in the shop, but there is no machine work in the school. For example, suppose the drill press is under consideration. They first read the catalogue description (catalogues are supplied in sets of twenty-five by the manufacturers). The technical names of parts are noted. Different machines are compared and their respective merits examined. The scientific principles involved in their operation are described. This leads naturally to a study of the blue prints, which are supplied by the manufacturers. This is followed by freehand drawings of some parts of the machine. In the discussion the mathematical relations receive

especial consideration. For instance, the speed of the spindle as determined by the relation of the diameters of the cone pulleys is a problem in complex fractions, and the boys for the first time in their lives discover the use of what in their early school days was a senseless puzzle. An hour's lesson on complex fractions follows, using an arithmetic first and then a prepared sheet of exercises applied to the drill press. These lessons are prepared beforehand with great care by the teachers. A blue print of each lesson, with the details to be worked out clearly indicated, is placed in the hands of each pupil, so that there is no waste of time. These when filled complete what are called "dope sheets" by the boys, and are filed by each boy in his large envelope. The exercises are arranged in sequence so as to conduct the boys through arithmetic, algebra, geometry, and trigonometry, using only those parts that have practical application in the shop with such essential principles as are necessary for an understanding of the shop problem.

The above description will apply fairly closely to two or three of the four hours' work a day. The last hour, as indicated before, is recreational, inspirational, informational, and cultural. A piano is provided, a stereopticon with hundreds of slides, maps, and charts, sets of books on civics and industrial biography, and so forth.

The employers and foremen say there is no loss in output by the boys' being out one half-day a week. They more than make up for the absence by their diligence and zeal when they are at work. When the boys start to school they are as a rule depressed, indifferent, disgruntled. They look upon their employer as an aristocrat, their foreman as a slave-driver, their machine as a treadmill, and the world at large as against them. Their faces are frozen in a perpetual grouch. The path to advancement seems long and uncertain. As they feel mind and body settling in a groove they become rebellious and ready to quit. The school comes as a new interest in their lives. They can scarcely realize at first that anybody cares, but soon they thaw out and a new light shines in their eyes. They see for the first time the purpose of instruction which bored them in school days. They have a motive. They can put their knowl-

edge to use. They become interested and intellectually awakened. Their attitude changes toward their employer, their foreman, their machine, the world. They are no longer mere hands, cubs, operatives; they are becoming masters of an honorable craft. As they are induced to go from one shop to another they have been known to make it a condition that they be permitted to attend the continuation school.

The Board of Education and others in our city who have seen the effect of this school on the boys persuaded the Ohio legislature last spring to pass a law authorizing boards of education to establish continuation schools and requiring the attendance in daytime, not to exceed eight hours a week, of all who go to work under sixteen years of age. The Cincinnati Board has set aside fifteen thousand dollars to put this law into operation in the year 1911. It is therefore evident that our experience gives us faith in the idea. We purpose in Cincinnati to open two classes of continuation schools, one compulsory, for those who are under sixteen, the other voluntary, for those who are apprenticed. The plans are now ready to open such a school in salesmanship for girls in stores.

It seems strange that all oversight of children ceases when they go to work, strange that the state has not considered it a duty to look after their education at the critical period of their existence. Then, if ever, they need moral guidance and ideals kept steadily before them. That is the time they feel their deficiencies and need instruction and direction. Then they need to be taught to apply what they know to a practical situation. Then their attitude is determined, and they will become mere drudges, shirks, and outcasts, or will acquire that joy in work which will transform their task into an interesting vocation and themselves into interested and ambitious craftsmen. As I see it, we should not wait for trade schools to catch boys and lead them to a vocation. We must catch the boys and girls when they go to work, letting them get their skill under commercial conditions but supplementing it as they go along with the guidance and instruction they need in this crisis of their lives.